UTILITY PATENT APPLICATION TRANSMITTAL
(Large Entity)
(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No.
YO999-421

Total Pages in this Submission
34

TO THE ASSISTANT COMMISSIONER FOR PATENTS
Box Patent Application
Washington, D.C. 20231

Transmitted herewith for filing under 35 U.S.C. 111(a) and 37 C.F.R. 1.53(b) is a new utility patent application for an invention entitled:

APPARATUS AND METHOD FOR USING A TARGET BASED COMPUTER VISION SYSTEM FOR USER INTERACTION

and invented by:

Scott Kirkpatrick, Frederick C. Kjeldsen and Lurng-Kuo Liu

If a CONTINUATION APPLICATION, *check appropriate box and supply the requisite information:*

☐ **Continuation**   ☐ **Divisional**   ☐ **Continuation-in-part (CIP)**   of prior application No.: _____

Which is a:

☐ **Continuation**   ☐ **Divisional**   ☐ **Continuation-in-part (CIP)**   of prior application No.: _____

Which is a:

☐ **Continuation**   ☐ **Divisional**   ☐ **Continuation-in-part (CIP)**   of prior application No.: _____

Enclosed are:

Application Elements

1. ☒ Filing fee as calculated and transmitted as described below

2. ☒ Specification having _____23_____ pages and including the following:

   a. ☒ Descriptive Title of the Invention

   b. ☐ Cross References to Related Applications *(if applicable)*

   c. ☐ Statement Regarding Federally-sponsored Research/Development *(if applicable)*

   d. ☐ Reference to Microfiche Appendix *(if applicable)*

   e. ☒ Background of the Invention

   f. ☒ Brief Summary of the Invention

   g. ☒ Brief Description of the Drawings *(if drawings filed)*

   h. ☒ Detailed Description

   i. ☒ Claim(s) as Classified Below

   j. ☒ Abstract of the Disclosure

P01ULRG/REV04

<table>
<tr><td rowspan="3">UTILITY PATENT APPLICATION TRANSMITTAL
(Large Entity)
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YO999-421</td></tr>
<tr><td>Total Pages in this Submission
34</td></tr>
</table>

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34

Application Elements (Continued)

3. ☒ Drawing(s) *(when necessary as prescribed by 35 USC 113)*

   a. ☐ Formal   Number of Sheets _____

   b. ☒ Informal   Number of Sheets   **5 (Figs. 1-5)**

4. ☒ Oath or Declaration

   a. ☐ Newly executed *(original or copy)*   ☒ Unexecuted

   b. ☐ Copy from a prior application (37 CFR 1.63(d)) *(for continuation/divisional application only)*

   c. ☒ With Power of Attorney   ☐ Without Power of Attorney

   d. ☐ *DELETION OF INVENTOR(S)*
       Signed statement attached deleting inventor(s) named in the prior application,
       see 37 C.F.R. 1.63(d)(2) and 1.33(b).

5. ☐ Incorporation By Reference *(usable if Box 4b is checked)*
    The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

6. ☐ Computer Program in Microfiche *(Appendix)*

7. ☐ Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all must be included)*

   a. ☐ Paper Copy

   b. ☐ Computer Readable Copy *(identical to computer copy)*

   c. ☐ Statement Verifying Identical Paper and Computer Readable Copy

Accompanying Application Parts

8. ☐ Assignment Papers *(cover sheet & document(s))*

9. ☐ 37 CFR 3.73(B) Statement *(when there is an assignee)*

10. ☐ English Translation Document *(if applicable)*

11. ☐ Information Disclosure Statement/PTO-1449   ☐ Copies of IDS Citations

12. ☐ Preliminary Amendment

13. ☒ Acknowledgment postcard

14. ☐ Certificate of Mailing

       ☐ First Class   ☐ Express Mail *(Specify Label No.):* _____

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Accompanying Application Parts (Continued)

15. ☐ Certified Copy of Priority Document(s) *(if foreign priority is claimed)*

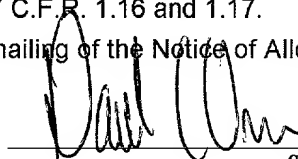16. ☐ Additional Enclosures *(please identify below):*

Fee Calculation and Transmittal

CLAIMS AS FILED

For	#Filed	#Allowed	#Extra	Rate	Fee
Total Claims	25	- 20 =	5	x $18.00	$90.00
Indep. Claims	5	- 3 =	2	x $78.00	$156.00
Multiple Dependent Claims (check if applicable) ☐					$0.00
				BASIC FEE	$760.00
OTHER FEE *(specify purpose)*					$0.00
				TOTAL FILING FEE	$1,006.00

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   ☐ Charge the issue fee set in 37 C.F.R. 1.18 at the mailing of the Notice of Allowance, pursuant to 37 C.F.R. 1.311(b).

_____
Signature

Dated: **October 19, 1999**

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APPLICATION

FOR

UNITED STATES LETTERS PATENT

APPLICANT NAMES: Scott Kirkpatrick
                     Frederick C. Kjeldsen
                     Lurng-Kuo Liu

TITLE: APPARATUS AND METHOD FOR USING A
          TARGET BASED COMPUTER VISION SYSTEM
          FOR USER INTERACTION

DOCKET NO.:   YO997-421

INTERNATIONAL BUSINESS MACHINES CORPORATION

APPARATUS AND METHOD FOR USING A
TARGET BASED COMPUTER VISION
SYSTEM FOR USER INTERACTION

BACKGROUND OF THE INVENTION

5 *Field of the Invention*

The present invention generally relates to a method and apparatus to

recognize actions of a user and to have those actions correspond to specific

computer functions.

Description of the Related Art

10 Many people find it difficult to use computers because of problems

operating current input devices such as a keyboard or a mouse. This includes

users with physical disabilities, young children and people who have never

learned to use a computer but find themselves confronted with one at a public

kiosk or similar workstation. Alternative input devices have been developed, such

15 as touch screens and single-switch devices, but these have two distinct

disadvantages. First, they rely on physical devices that often must be carefully

setup for the user, and are prone to damage or vandalism in public places.

Second, they do not allow the full range of expression needed to effectively interact with current computer applications.

It is therefore desirable to provide a means to allow people to use computer systems without the use of physical interface devices. Many methods have been explored to allow users to interact with machines by way of gestures and movements using cameras. Most of these methods, however, have one or more of several limitations. Either they are very limited in the type of gesture they can recognize, they require extensive customization for a specific user, they are not robust in the face of environmental conditions, they are not reliable or they require extensive user training. A robust, flexible and user friendly method and apparatus is needed to allow a computer to recognize a wide range of user actions using a camera.

SUMMARY OF THE INVENTION

In view of the foregoing and other problems of the conventional methods, it is, therefore, an object of the present invention to provide a structure and method for training a computer system to recognize specific actions of a user.

The method may include displaying an image of a user within a window on a screen. The window may include a target area. The method may also include associating a first computer event with a first user action displayed in the

YOR.132
YO999-421   2

target area and storing information in a memory device such that the first user action is associated with the first computer event.

A system is also provided that may associate specific user actions with specific computer commands. The system may include an image capture system that captures an image of a user. The system may also include an image display system that displays said image captured by the image capture system within a window on a display screen. The system may recognize the specific user actions and associate the specific user actions with the specific computer commands.

Other objects, advantages and salient features of the invention will become apparent from the following detailed description taken in conjunction with the annexed drawings, which disclose preferred embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described in detail with reference to the following drawings in which like reference numerals refer to like elements and wherein:

Fig. 1 shows the image capture system and display device according to the present invention;

Figs. 2A and 2B show two different positions of the user and the target area within a window on a display according to the present invention;

Fig. 3 is a flowchart showing a preferred method of the present invention;

Fig. 4 shows a hardware configuration of an information

handling/computer system for operating the present invention; and

Fig. 5 shows a magnetic data storage diskette that may store a program

according to the present invention.

DETAILED DESCRIPTION OF PREFERRED
EMBODIMENTS OF THE INVENTION

5

As will be described below in greater detail, the present system and

method according to the present invention allows a user to define a target (or

target region) in an image provided by a camera (i.e., an image capture system).

10   The user is allowed to describe or demonstrate what it means to activate the target

and to define a specific computer function to be associated with that activation

(e.g., mouse click). Thereafter, whenever the system detects activation of the

target, the computer system will perform the associated function. The system may

activate the target by: (1) detecting a state, (2) detecting a motion or (3) detecting

15   intersection between an object in the scene and an object. These ways of

activating the target will be discussed below in greater detail. One skilled in the

art would understand that these methods of activating the target are illustrative

only and are not meant to be limiting. That is, other methods of activating the

target are also within the scope of the present invention.

The present invention will now be described with reference to the accompanying figures. Fig. 1 shows a display device 10 having a display screen 12. The display device 10 preferably is a conventional computer screen display and is connected to a conventional computer system as will be described below. An image capture system 20 may be positioned at any location such that it captures the image of the user. In one embodiment, the display device 10 and image capture system 20 may be provided in public kiosks.

As shown in Fig. 1, the display screen 12 includes a window 30 that displays a picture of the image that is captured by the image capture system 20. The window 30 is shown in the lower left-hand corner of the display screen 12 but it is not limited to this location. Rather, the window 30 may be displayed at any appropriate location on the screen 12. The computer system will include the appropriate hardware and software components that will connect the image capture system 20 to the computer system such that the image captured by the image capture system 20 is displayed within the window 30. The display screen 12 will also show a normal computer screen and will provide computer prompts in a normal manner.

The computer system preferably includes a training phase that occurs before the system begins operation. The system operates based on software/hardware that will be connected to the system. In the training phase, the image capture system 20 captures an image of the user and displays the "reversed"

image within the window 30 on the display screen 12. The user sees himself in much the same way as he would see himself in a mirror. In the training phase, the computer system is programmed to produce a visible target area 32 within the window 30 such as shown in Figs. 2A and 2B. The target area 32 is preferably

5   movable about the window 30 using a pointing device or speech recognition system. The system is also capable of locating another target area 32 within another area of the window 30. The computer system will be trained to associate specific user movements/actions (or gestures) with respective computer functions. The user preferably demonstrates or describes the action. Demonstration occurs,

10   for example, by the user hitting a key when the action is being performed, or just before and just after the action is performed. Features relating to the movements/actions will be stored in a memory device so the system will recognize the specific movements/actions after the training phase and associate the movements/actions with the respective computer function.

15   In the training phase, the image capture system 20 initially displays an image of the user within the window 30. Features of this image may be stored in a memory device in order to help in recognizing the future movements/actions of the user. The target area 32 is displayed in the window 30 and may be positioned by the user or may be automatically positioned by the system. While the target

20   area 32 is displayed within the window 30, one skilled in the art would understand

that the target area 32 corresponds to a specific area as seen by the image capture

system 20.

The target area 32 may be a rectangular shape, a square shape, a circle

shape or any other type of shape. As discussed above, the user may locate or

5   relocate the target area 32 about the window 30 using a pointing device or speech

recognition system. The user may also manipulate the size (i.e., the dimensions)

of the target area using respective input commands. The user may also define

more than one target area, each with its associated function.

The computer system preferably prompts the user to perform an action

10   within the target area 32 that will be associated with a specific computer function.

For example, in Fig. 2A, the user is shown as tilting his head to the left within the

window 30. By tilting the head to within the target area 32, the computer system

recognizes the action within the target area 32. For example, the system may use

background averaging, template or color predicate methods to recognize when

15   part of a user's body is within the "target". Other methods will be described

below. The training image(s) or features extracted from the training image(s),

such as a summary, may then be stored in a memory device so that the computer

system may recognize this future movement. While Fig. 2A shows movement of

the head, this movement/action is not to be limiting as a type of movement/action

20   (gesture) of a user. Rather, the user may move a hand, another part of the user's

body or another object within the target area 32.

The movement/action will then be associated with a specific computer function. For example, the user may be asked to associate that specific movement/action within the target area 32 as corresponding to a specific computer function. One preferred computer function is that of a mouse click or the

5   movement of a pointing device on the screen (i.e., movement of a cursor to the left or right). The movement may also correspond to other computer functions and/or letters/symbols. The computer system associates the inputted computer function (i.e., a mouse click) as corresponding to the movement/action shown within the target area 32.

In a subsequent step of the training phase, another target area 32 may be

10   placed in a new location as shown in Fig. 2B. In this figure, the user performs a second movement/action such as tilting the head to the right as viewed in the window 30. The altered image of the user within the target area 32 may be stored in a memory device. The computer system may again ask for (or automatically

15   provide) a respective computer function that will correspond to this movement. The association is stored in the memory device for future use.

The above example describes that the user performs a movement/action and then the user provides a corresponding computer function that will be associated with that movement. However, the computer system may

20   automatically provide a respective computer function based on either a first, second or third movement or may merely automatically associate different

YOR.132
YO999-421   8

movements with a specific computer function. What is important is that the movement of the user is associated with a respective computer function either automatically or based on the user requested function.

This training phase continues so that the computer system will be trained to recognize different computer functions based on different movements/actions of the user.

Once the user has appropriately trained the computer system to recognize his/her movements/actions (or gestures), the computer system may enter a normal operation phase while running a specific program/game/utility in which it will recognize the user's movements, such as a head tilt to the right or to the left and will associate that movement with the previously stored computer function. The computer system accomplishes this by capturing the image of the user using the image capture system 20. The image of the user is preferably displayed on the display screen 12 so the user will see his/her own movements. The target area 32 does not need to be displayed in this mode. The user may then perform normal computer operations in a similar manner to a person using a mouse or other pointing device because the computer has been trained to recognize specific functions based on the movements of the user.

Fig. 3 is a flowchart showing the inventive methodology of the training phase according to the present invention. In step S100, a user image is displayed on the screen 12 within the window 30. Subsequently, the target area 32 is

displayed in the window 30 in step S104. The user image is altered preferably by user movement in the target area 32 in step S106. Data from the training image(s) may be stored in step S108. The stored data is then associated with a specific computer function in step S110. This association may be stored in memory in

5   step S112. Other movements/actions may be associated with additional functions by producing another target area 32 in step S116 and repeating steps S106-S114 for that new target area 32. It is understood that while Fig. 3 shows a preferred method of the present invention, the number of steps and the order of the steps need not be the same as shown in Fig. 3.

10   Figure 4 illustrates a typical hardware configuration of an information handling/computer system for operating the present invention. Such a system preferably has at least one processor or central processing unit (CPU) 300. The CPU 300 may be interconnected via a system bus 301 to a random access memory (RAM) 302, read-only memory (ROM) 303, input/output (I/O) adapter 304 (for

15   connecting peripheral devices such as disk units 305 and tape drives 306 to the bus 301), communication adapter 307 (for connecting an information handling system to a data processing network), user interface adapter 308 (for connecting a keyboard 309, microphone 310, mouse 311, speaker 312, image capture system 20 and/or other user interface device to the bus 301), and display adapter 313 (for

20   connecting the bus 301 to a display device 10). As is understood to one skilled in

the art, the program that executes the above described method according to the present invention may be stored on a floppy disk or be stored within the memory.

Such a method as described above may be implemented, for example, by operating a computer, as embodied by a digital data processing apparatus, to execute a sequence of machine-readable instructions. These instructions may reside in various types of signal-bearing media.

Thus, the present invention may be directed to a programmed product, including signal-bearing media tangibly embodying a program of machine-readable instructions executable by a digital data processor.

This signal-bearing media may include, for example, a random access memory (RAM) such as for example a fast-access storage contained within the computer. Alternatively, the instructions may be contained in another signal-bearing media, such as a magnetic storage diskette 900 shown exemplarily in Figure 5, directly or indirectly accessible by the computer.

Whether contained in the diskette, the computer, or elsewhere, the instructions may be stored on a variety of machine-readable data storage media, such as DASD storage (e.g., a conventional "hard drive" or a RAID array), magnetic tape, electronic read-only memory (e.g., ROM, EPROM, or EEPROM), an optical storage device (e.g., CD-ROM, WORM, DVD, digital optical tape, etc.), paper "punch" cards, or other suitable signal-bearing media including transmission media such as digital and analog and communication links and

wireless. In an illustrative embodiment of the invention, the machine-readable instructions may comprise software object code, compiled from a suitable language.

One alternative to this invention is the use of a touch screen and various onscreen cues or targets. This has the drawback that it is less durable than a camera (that can be located safely behind a small hole in the display bezel or kiosk facing), and can only be used at close range.

As discussed below, the present invention has at least three different methods to activate the target. These are: (1) detecting a state, (2) detecting a motion, or (3) detecting intersection between an object in the scene and an object. These methods will now be discussed in greater detail. Other methods of activating the target are also within the scope of the present invention as these methods are merely illustrative.

The first method to activate the target is detecting a pattern of color. During the training phase, the state of the target 32 may be demonstrated to the system. A summary of this color pattern (i.e., a color histogram) may be saved. The color pattern of each subsequent image during the normal operational phase may be matched to the one from the training phase, and if it is sufficiently close, then the target will be considered activated. Alternatively, two states may be demonstrated during training (i.e., target empty and target full). The new patterns may be matched to each of those, and the system will decide which is closer.

Other types of states may also be statistical properties, such as average pixel intensity, shape properties such as number or pattern of lines, and possibly others.

A second method of activating the target is detecting a motion. During training, the user may either describe or demonstrate a motion within the target

5   32. This may be, for example, a left-to-right motion. The system may monitor the motion within the target 32 during subsequent images using standard techniques (e.g. optical flow, feature tracking, etc) and produce summaries of that motion. When a target motion matches the originally trained motion, then the target will be considered activated. To demonstrate the motion, during training

10   the user may prime the system by some standard technique such as a menu item. Then, the user may perform the motion (e.g., wave their hand through the target) and then tell the system they were done. The system monitors the motion within the target during that time interval, and produces and saves a summary of that motion. The system then monitors and matches the motion summary as described

15   above.

A third method of activating the target may be by intersection detection. During training, the user may identify an object in the scene. The system may then track that object in subsequent images. When that object intersects the target, the target is considered activated. Object tracking can be done using a

20   variety of existing techniques. One class of tracking techniques involves identifying the object explicitly for the system. The system then extracts

information that uniquely identifies the object (i.e., color pattern, pixel template, etc). Subsequent images are searched for that object using color segmentation, template matching, etc. A second class involves showing the system a background image during training that does not contain the object. The system

5   compares subsequent images to the background image to determine if the object is present. In either case, the system may identify the boundaries of the object being tracked and determines if it overlaps the target 32.

As a further embodiment, the target region may be used for more than binary activation. That is, rather than being activated or not, the target may be

10   determined to be in a number of states. Each of these states may have a different computer function associated with it. For example, the motion (e.g. a hand in the target) within the target may be summarized as an average motion vector. As one example, the cursor on the screen may then be moved by a direction and an amount derived by passing that vector through an appropriate transfer function.

15   Further, if a user's hand (or other type of activating object) remains within the target region beyond a predetermined time, then the cursor on the screen would continue to move in a left direction, for example. Other variations are also apparent to one skilled in the art.

While the invention has been described with reference to specific

20   embodiments, the description of the specific embodiments is illustrative only and is not to be considered as limiting the scope of the invention. Various other

modifications and changes may occur to those skilled in the art without departing

from the spirit and scope of the invention.

What is claimed is:

1   1. A method of enabling a computer system to recognize specific

2 actions of a user, said method comprising:

3   displaying an image of a user within a window on a screen, said

4 window including a target area;

5   associating a first computer event with a first user action displayed

6 in said target area; and

7   storing information in a memory device such that said first user

8 action is associated with said first computer event.

1   2. The method of claim 1, wherein said association comprises said

2 computer system detecting a change of state within said target area as said first

3 user action.

1   3. The method of claim 2, wherein said change of state comprises a

2 change of a pattern of color in said target area.

1   4. The method of claim 3, wherein said association further comprises

2 storing a summary of said color pattern of said target area.

1   5.   The method of claim 1, wherein said association comprises said

2   computer system detecting motion within said target area as said first user action.

1   6.   The method of claim 1, wherein said association comprises said

2   computer system detecting an object entering said target area as said first user

3   action.

1   7.   The method of claim 1, wherein said association comprises said

2   computer system recognizing said first user action as a specific computer function

3   to execute when said first user action occurs.

1   8.   The method of claim 1, wherein said target area is one of a

2   rectangular area, a circular area and a square area.

1   9.   The method of claim 1, wherein said association comprises

2   associating a plurality of computer events while said first user action remains

3   displayed in said target area.

1   10.   The method of claim 1, wherein said association comprises

2   associating a plurality of computer events with said first user action.

1   11.   The method of claim 1, further comprising positioning said target

2   area within said window.

1   12.   The method of claim 11, wherein positioning said target area

2   comprises locating said target area within said window using user input

3   commands.

1   13.   The method of claim 1, further comprising:

2   producing another target area within said window;

3   associating a second computer event with a second user action

4   displayed in said another target area; and

5   storing information in said memory device such that said second

6   user action is associated with said second computer event.

1   14.   The method of claim 1, wherein said first computer event is a

2   mouse click action.

1   15.   The method of claim 1, wherein said first user action comprises a

2   different image of said user within said target area.

YOR.132
YO999-421   18

1   16.   A method of using a computer system having an image capture

2 system that displays an image of a user on a display screen, said method

3 comprising:

4   enabling said computer system to recognize a specific user action

5 as corresponding to a specific computer event;

6   capturing said specific user action with said image capture system;

7 and

8   performing said specific computer event when said specific user

9 action is captured by said image capture system.

1   17.   The method of claim 16, wherein said enabling comprises:

2   displaying said image of said user within a window on said display

3 screen, wherein a target area is located within said window;

4   associating said specific user action with said specific computer

5 event; and

6   storing information in a memory device such that said specific user

7 action is associated with said specific computer event.

1   18.   The method of claim 16, further comprising positioning said target

2 area within said window.

1   19.   The method of claim 16, further comprising:

2   producing another target area within said window;

3   associating a second computer event with a second user action

4   displayed in said another target area; and

5   storing information in said memory device such that said second

6   user action is associated with said second user event.

1   20.   A system that associates specific user actions with specific

2   computer commands, said system comprising:

3   an image capture system that captures an image of a user;

4   an image display system that displays said image captured by said

5   image capture system within a window on a display screen; and

6   a computer system that recognizes said specific user actions and

7   associates said specific user actions with said specific computer commands.

1   21.   The system of claim 20, wherein said computer system includes a

2   training phase to train the computer system to recognize said specific user actions,

3   said training phase comprising:

4   displaying said image of said user that is captured by said image

5   capture system within said window on said display screen, said window including

6   a target area;

7   associating a first computer command with a first user action

8 displayed in said target area; and

9   storing information in a memory device such that said first user

10 action is associated with said first computer command.

1   22. The system of claim 21, wherein said training phase further

2 comprises:

3   producing another target area within said window;

4   associating a second computer command with a second user action

5 displayed in said another target area; and

6   storing information in said memory device such that said second

7 user action is associated with said second computer command.

1   23. A program storage device readable by machine, tangibly

2 embodying a program of instructions executable by the machine to perform

3 method steps for training a system to recognize specific user actions, said method

4 steps comprising:

5   displaying an image of a user within a window on a screen, said

6 window including a target area;

7   associating a first computer event with a first user action displayed

8 in said target area; and

9   storing information in a memory device such that said first user

10   action is associated with said first computer event.

1   24.   A method of enabling a computer system to recognize specific

2   actions of a user, said method comprising:

3   associating a first computer event with a first action displayed on a

4   display screen; and

5   storing information in a memory device such that said first action

6   is associated with said first computer event.

1   25.   The method of claim 24, further comprising displaying an image of

2   said user within a window on said screen, said window including a target area,

3   and said association comprises associating said first computer event with said first

4   action displayed on said screen.

APPARATUS AND METHOD FOR USING A
TARGET BASED COMPUTER VISION
SYSTEM FOR USER INTERACTION

ABSTRACT OF THE DISCLOSURE

5   A method and apparatus are provided for training a computer system to

recognize specific actions of a user. This may include displaying an image of a

user within a window on a screen. The window includes a target area. This may

also include associating a first computer event with a first user action displayed in

the target area and storing information in a memory device such that the first user

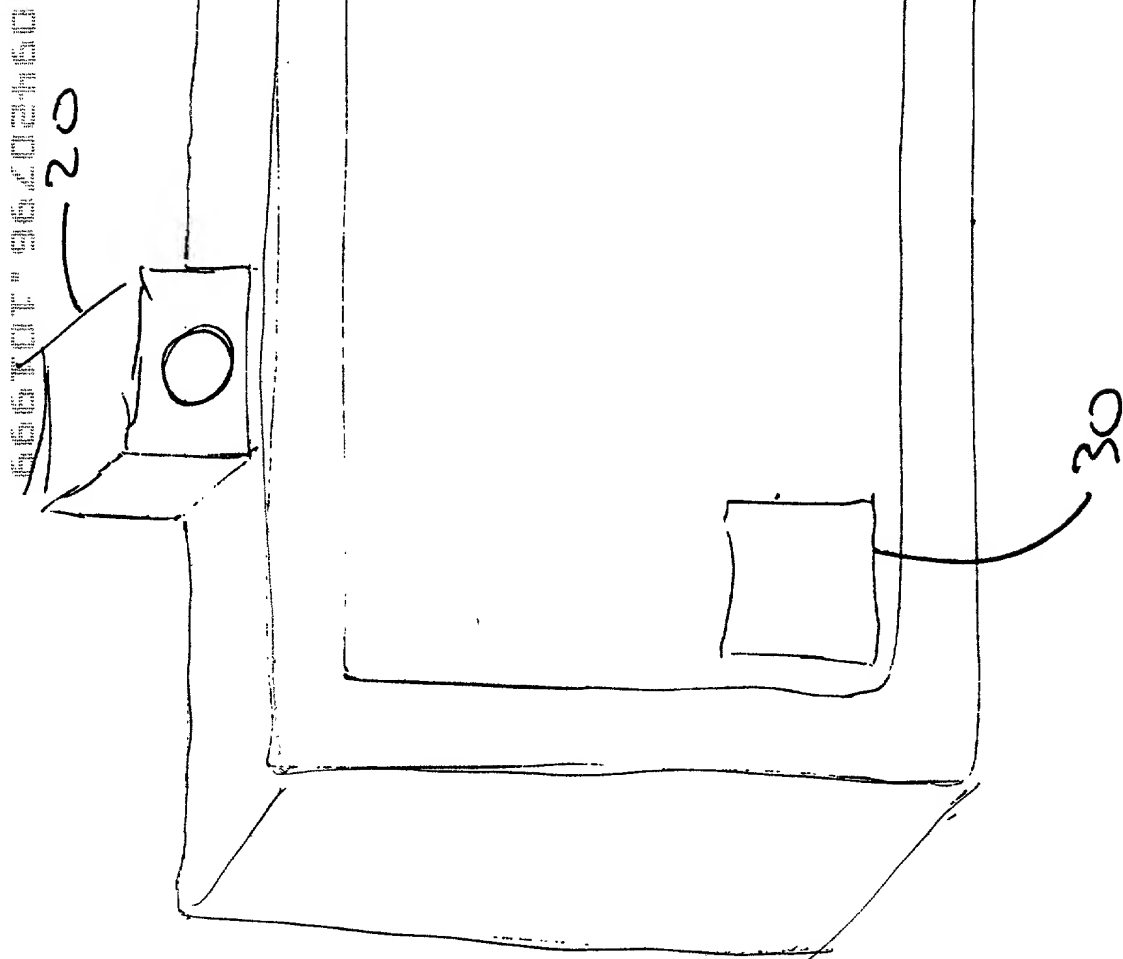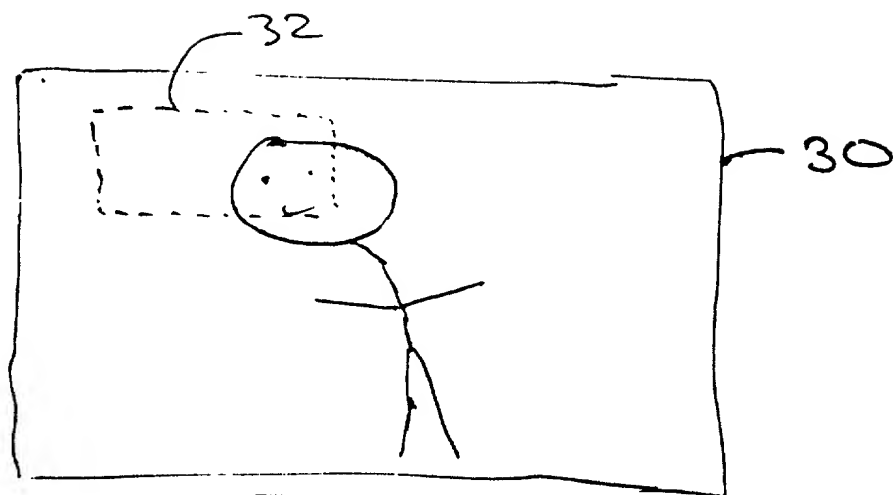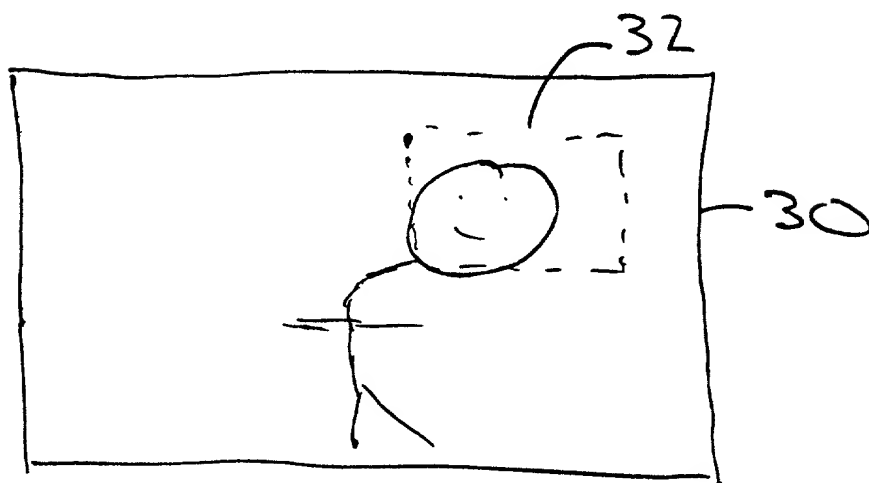10   action is associated with the first computer event.

FIG. 1

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FIG.2A

FIG.2B

S100 — Display user image on screen 12 (first image)

S104 — Display target area 32 in window 30

S106 — Alter user image at least in target area 32

S108 — Store data relating to altered user image

S110 — Associate stored alter user image with specific computer function

S116 — Produce another target area 32

S112 — Store association in memory
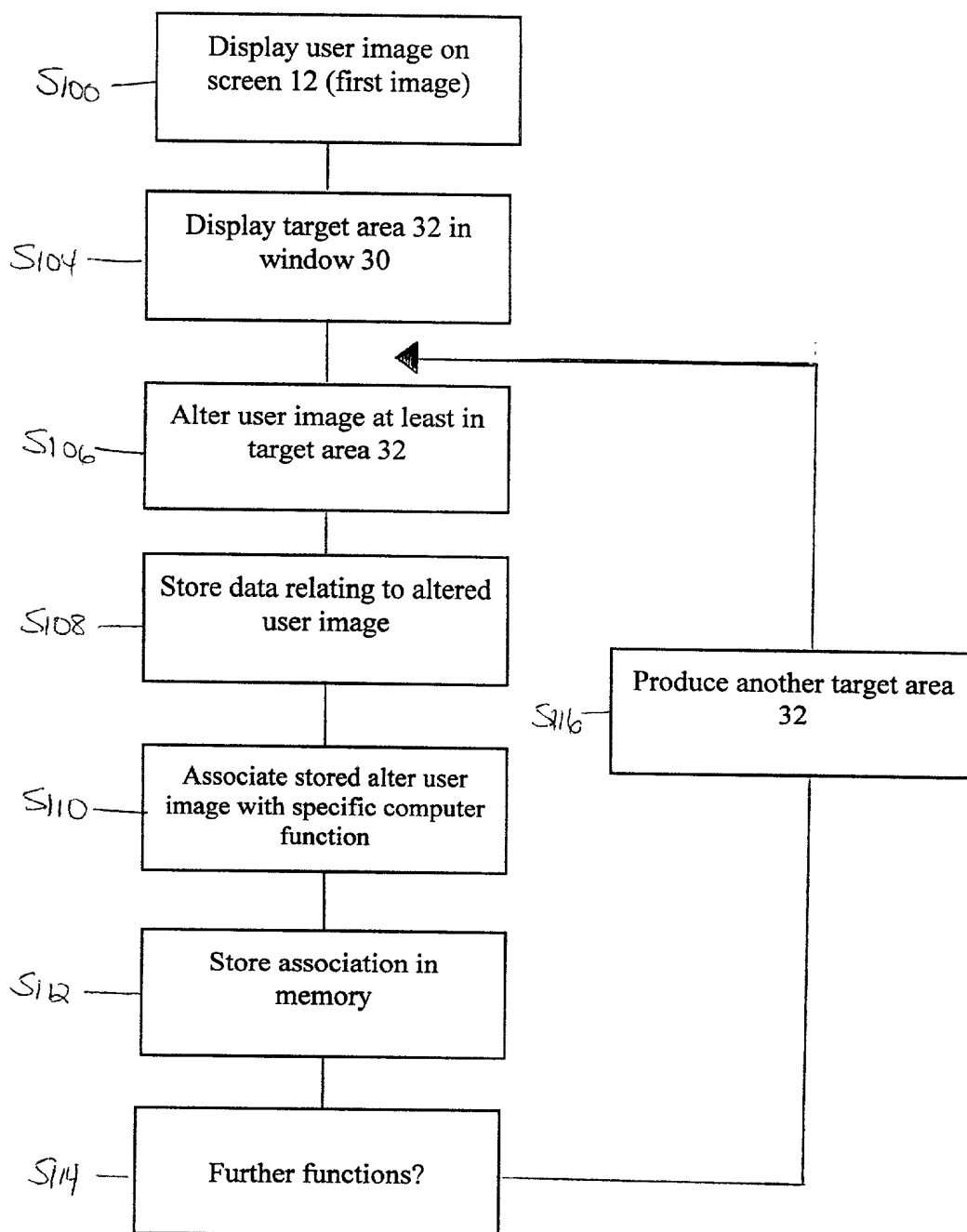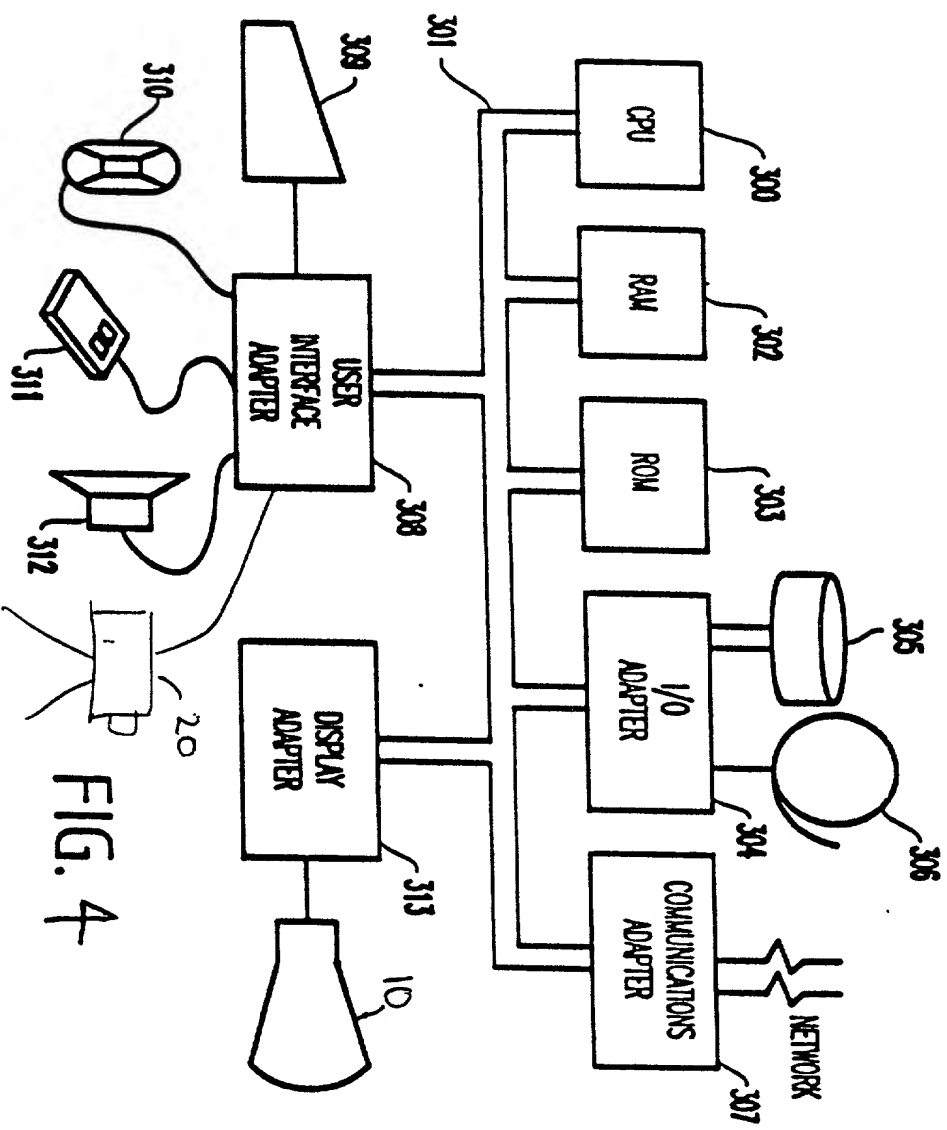
S114 — Further functions?
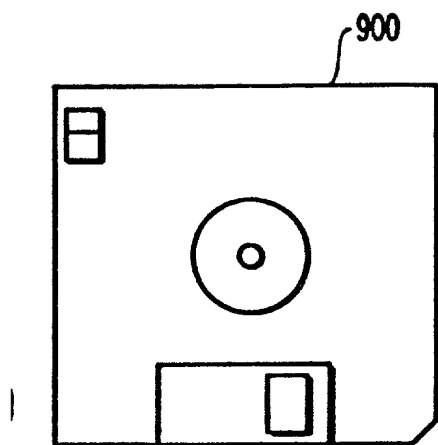
FIG. 3

FIG. 4

900

FIG.5

DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name; I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: APPARATUS AND METHOD FOR USING A TARGET BASED COMPUTER VISION SYSTEM FOR USER INTERACTION

the specification of which:
(check one)

⊠ is attached hereto.

☐ was filed on _____, as Application Serial No. _____ and was amended on _____.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, § 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s):

Number	Country	Day/Month/Year	Priority Claimed

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

Prior U.S. Applications:

Serial No.	Filing Date	Status

I hereby declare that all statements made herein of my own knowledge are true arid that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

As a named inventor, I hereby appoint the following attorneys and/or agents to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: We hereby appoint Manny Schecter, Registration No.31,722, Terry J. Ilardi, Registration No 29,936, Christopher A. Hughes, Registration No. 26,914, Edward A. Pennington, Registration No. 32,588, John E. Hoel, Registration No. 26,279, Joseph C. Redmond, Jr., Registration No. 18,753, Douglas W. Cameron, Registration No. 31,596, Louis P. Herzberg, Registration No. 41,500, Kevin M. Jordan, Registration No.40,277, Stephen C. Kaufman, Registration No.29,551, Daniel P Morris, Registration No.32,053, Louis J Percello, Registration No.33,206, Jay P. Sbrollini, Registration No. 36,266, David M. Shofi, Registration No. 39,835, Paul J. Otterstedt, Registration No 37,411 and Robert M. Trepp, Registration No. 25,933, to prosecute this application and transact all business in the United States Patent and Trademark Office connected therewith.

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